

PATENT SPECIFICATION

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COMPLETE SPECIFICATION

DRAWINGS ATTACHED

Improved Fastener Assembly

We, VSI CORPORATION, a corporation organized and existing under the laws of the State of Illinois, United States of America, of 739 East Walnut Street, Pasadena, State 5 of California, United States of America, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the

10 following statement:—

This invention is directed to a new and improved fastener assembly including a fastener strip construction for mounting a fastening member in a loosely fitting manner while firmly holding the same against rotation. Fastener strips of this type find particular application in joining structural members and/or parts together.

In the practice of the present invention, 20 the fastener strip may be formed from a metallic strip of generally rectangular section and of any desired shape such as arcuate or the like depending on the environment of intended use. A series of openings are 25 formed at desired intervals by deforming a portion of the strip out of the plane thereof. The deformed portion is divided at the center of the opening and rolled out of the plane of the strip into a pair of upstanding lug members which are disposed generally perpendicular to the face of the strip. A threaded fastener such as a bolt or nut is provided with a flat base portion having means thereon which co-operate with the lug 30 members to permit mounting the threaded portion in a floating manner while holding the same against rotation. The upstanding lugs are then rolled over a portion of the base to maintain the fastener in close engagement with the fastener strip.

The improved mounting of fasteners in the manner briefly described above and to be more completely described hereinafter

[Price

provides distinct advantages in the form of promoting economy in manufacture, providing a lightweight retainer strip usable in a wide range of applications, and most importantly providing a torque resistant mounting which satisfies the stringent requirements of the aircraft and aerospace industry in diverse applications.

Accordingly this invention consists in an improved fastener assembly including a fastener strip for use in joining structural members together comprising an elongated strip, at least one aperture in said strip, said aperture being formed by punching out a pair of upwardly projecting lug members of uniform transverse width, a fastener having a flat base portion supporting a threaded portion, said flat base portion having slots at opposite sides thereof for interlocking co-operation with said lugs and being adapted to loosely hold said threaded portion in alignment with said aperture, said lugs being bent at the respective ends thereof into laterally extending flange portions overlying said fastener base portion to maintain the same held against rotation by said lugs being maintained in interlocking engagement with said slots.

Specific objects and advantages of the invention will become readily apparent from the following description when reference is made to the accompanying drawings 75 wherein:

Fig. 1 is a fragmentary perspective view of the fastener strip of the present invention having a flanged fastener mounted thereon;

Fig. 2 is an enlarged plan view of the 80 fastener strip of Fig. 1;

Fig. 3 is a cross sectional view taken along the lines 3-3 of Fig. 2;

Fig. 4 is a top plan view of the fastener strip mounting a modified form of flanged 85 fastener;

Fig. 5 is a cross sectional view taken along the lines 5-5 of Fig. 4;

Fig. 6 is a cross sectional view of a fastener similar to Fig. 5 having a modified form of flange;

Fig. 7 is a view in elevation of a threaded bolt used in the embodiment of Fig. 6 with the shank being shown fragmentarily; and

Fig. 8 is a bottom plan view of the embodiment of Fig. 7.

Referring now to Fig. 1, the fastener strip is indicated generally at 10 being of generally rectangular cross section. The strip 10 is broken away at opposite ends for convenience in illustration, however, it is to be understood that the strip may be formed into any desired length and/or shape depending upon the particular application and/or the environment of use.

A fastener assembly is indicated generally by reference character 11 which is shown with a flanged fastener of the type known as a flanged nut. The flanged nut 12 is provided with a tubular barrel portion 13 and a generally flat base portion 14 having a pair of openings or slots 15 and 16 therein which are loosely held by lug members 17 and 18 integral with the fastener strip 10.

As is best seen in Fig. 3, an aperture or opening 19 is provided in the retainer strip 10 extending from one surface to the other to permit passage of a fastener to co-operate with the fastener carried on the strip 10. In the present design, the flanged nut 12 is held on the strip 10 so that the tubular barrel portion 13 is loosely aligned with the aperture or opening 19 to receive a bolt or the like.

In forming the opening 19, material is forced out of the plane of the strip 10 by punching or the like into a pair of upstanding lugs of the shape shown in dotted lines at 20 and 21. A flanged nut 12 having openings 15 and 16 spaced-apart a dimension approximately equal to the dimension between the upstanding lugs shown in dotted lines at 20 and 21 is brought into register with the lug members 20 and 21 so that the lugs extend therethrough. Thereafter, the lug members are rolled over at their ends to extend over a portion of the base as is shown by the flanges 22 and 23 in solid lines forming a part of the lugs 17 and 18.

By appropriately dimensioning the spacing and size of the openings 15 and 16 relative to the spacing and size of the lugs, slight movement of the fastener relative to the strip is permitted, while a positive restraint against rotation is provided. Obviously, a certain degree of control over the torsional resistance can be exercised merely by selection of the type and thickness of the raw material for the retainer strip 10. While the flanges 22 and 23 are illustrated as being bent oppositely or away from each

other, it will become obvious that the openings 15 and 16 may be formed in the marginal edges of the base 14 being bounded on three sides only, and the flanges 22 and 23 bent inwardly towards the tubular upstanding barrel 13 on the flanged nut 12 with equal success.

The fastener strip 10 may be carried by one of the parts to be joined, or alternatively may be retained by the fastener which cooperates with the fastener floatingly mounted on the retainer strip 10. In either event, it is apparent that the fastener mounted on the fastener strip 10 is positively restrained from rotation while being movable longitudinally and laterally of the strip slight amounts to accommodate any misalignment between parts as they are brought into position for joining.

A modified form of the invention is illustrated in Figs. 4 and 5 including a fastener strip 30 having a retainer assembly indicated generally at 31. A fastener 32 is mounted in the retainer strip 30 forming the fastener assembly 31. The fastener 32 in the present instance comprises a bolt member having a generally rectangular flanged head or base 33 and threaded shank 34. The flanged head or base 33 is provided with openings or slots 35 and 36 which are interfitted with a pair of lugs 37 and 38 formed integral with the strips 30.

The lugs 37 and 38 include an upstanding portion 39 and 40 respectively terminating in turned flanges 41 and 42 bent into overlying relation to the base or flanged head 33 of the fastener 32. The lugs 37 and 38 are formed by removing material out of an opening or aperture 43 through which the shank 34 of the fastener 32 may project, the operation being described above.

A slightly modified form of fastener assembly is shown in Figs. 6-8. As is apparent in Fig. 6, a fastener strip 50 of the type described above is provided with a fastener assembly 51 both of which are shown in cross-section. The fastener assembly 51 includes a fastener 52 having a base portion 53 and a shank portion 54. The base portion or flanged head 53 is formed into a configuration such as that shown in the plan view of Fig. 4 having slots 55 and 56 at opposite sides for interlocking engagement with the lug members 57 and 58 which are formed in the manner described above.

The base portion 53 of the fastener 52 is modified on the underside to include lower shoulder portions 59 and 60 which project into the opening 61 formed in the strip 50. The shoulder portions 59 and 60 are loosely received in the opening 61 in the strip 50 to permit slight floating movement therebetween while being normally engageable with the sides of the opening 61 when torque is applied in order to supplement the resist-

ings action of the lugs 57 and 58 as they engage the slots 55 and 56.

As is evident in the embodiments of Figs. 4-8, the fastener strip may be mounted on one side of the members to be joined with the bolt member 34 extending therethrough to receive a co-operating part and fastener. The fastener strips 30 and 50 may be attached to one of the parts to be joined or in the alternative may be retained on the parts by merely being fastened in place.

In the embodiment of Figs. 4-8, the shank on the fastener projects through the fastener strip and receives a co-operating nut thereon. The clamping forces draw the head against the upper surface of the fastener strip while the lugs prevent rotation of the fastener during the fastening operation. In this manner, the retainer is securely held against the parts or structure joined.

From the foregoing it will be obvious to those skilled in the art that the improved fastener assembly provides distinct advantages in that high resistance to torque can be provided in a lightweight retainer strip. In addition, the fastener assembly mounts the fastener for free floating movement to compensate for any misalignment of co-operating parts. In high torque application, the downwardly projecting shoulder portions may be provided to increase the total resistance against rotation without requiring modification of the fastener strip.

As pointed out above, in the manufacture of embodiments shown, the fastener lugs are formed by dividing the material at the center of the opening, and thereafter bending it into vertically projecting lug portions as the opening is formed. The fastener chosen for the particular application may then be inserted having suitably shaped slots in the base such as those shown and described above. The lugs are then rolled over at their ends to retain the fastener on the strip. By the lugs being engaged with the slots outwardly of the threaded portion of the fastener, considerable resistance to torque is developed.

The fastener strip may be formed of any suitable material and due to its improved design minimizes raw material requirements and in the final form requires a minimum volume of material when resistance to torque is considered, permitting use of materials having greater strength and density such as steel even though an aerospace or aircraft application is contemplated. Obviously, the fastener strip between the fastener assemblies may have any excess material removed to enhance the over-all lightness of the retainer assembly if desired.

WHAT WE CLAIM IS:—

- An improved fastener assembly including a fastener strip for use in joining

structural members together comprising, an elongated strip, at least one aperture in said strip, said aperture being formed by punching out a pair of upwardly projecting lug members of uniform transverse width, a fastener having a flat base portion supporting a threaded portion, said flat base portion having slots at opposite sides thereof for interlocking co-operation with said lugs and being adapted to loosely hold said threaded portion in alignment with said aperture, said lugs being bent at the respective ends thereof into laterally extending flange portions overlying said fastener base portion to maintain the same held against rotation by said lugs being maintained in interlocking engagement with said slots.

2. The fastener assembly of claim 1 wherein said base on said fastener is provided with polygonal shoulder portions loosely interfitted with said aperture formed in said strip thereby to increase the resistance to rotation.

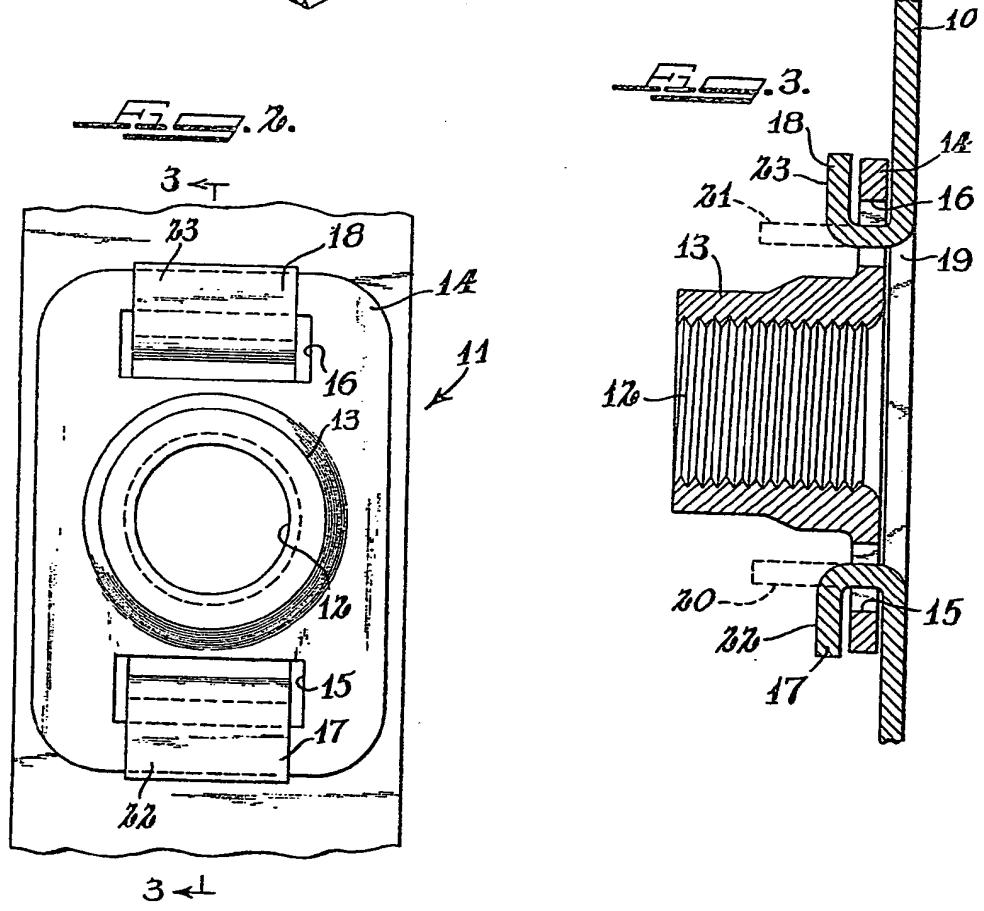
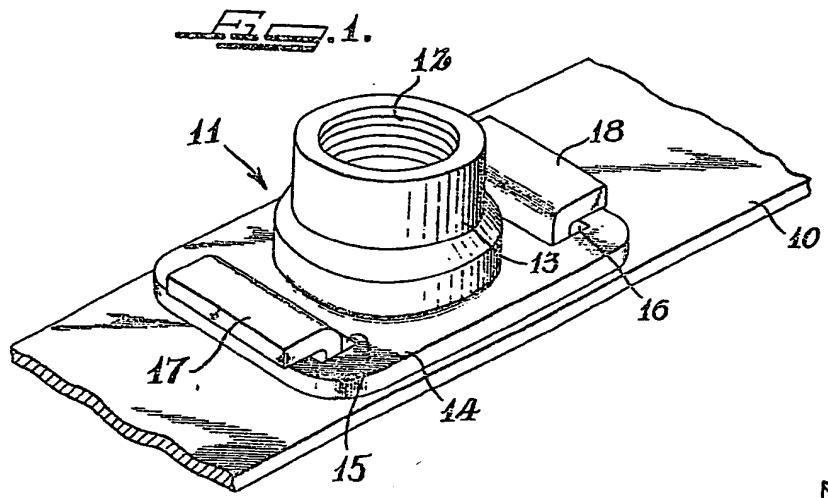
3. The fastener assembly of claim 1 wherein said slots engage said lugs outwardly of said threaded portion on said fastener.

4. An improved fastener assembly including a strip for use in mounting a fastener against rotation in a loosely fitting manner so as to have a high resistance to torque comprising an elongated metallic strip having oppositely facing upper and lower surfaces, a plurality of openings provided at spaced intervals in said strip and extending from one surface to the other to admit co-operating fastener members therethrough, a pair of upstanding lug members of uniform transverse width formed from the material of said strip in forming each of said openings, each of said lug members having a portion thereof projecting generally perpendicularly from one of said faces on said strip, said fastener having a generally flat base portion, a pair of slots formed in said base portion on opposite sides of an upstanding threaded portion, said slots being loosely interfitted with said upstanding portions on said lugs, and each of said lugs being bent at its end to provide a flanged end portion overlying a part of said base to maintain said slots interlocked with said upstanding portions on said lugs and thereby loosely holding said fastener against rotation.

5. The fastener assembly of claim 4 wherein said base portion is provided with polygonal shoulder portions conforming with the shape of said opening in said strip.

6. An improved fastener assembly, substantially as hereinbefore described, having reference to the accompanying drawings.

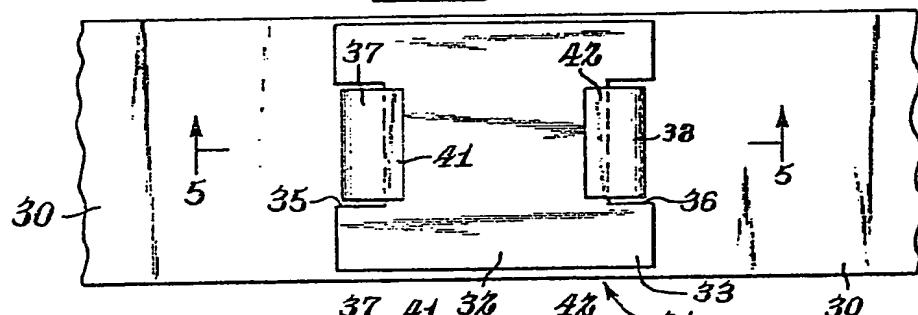
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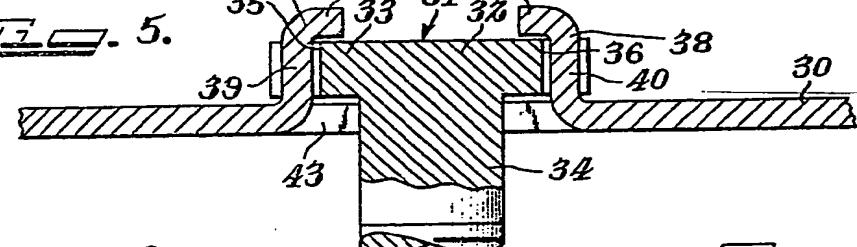
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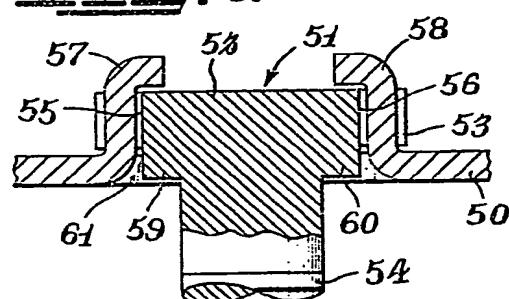
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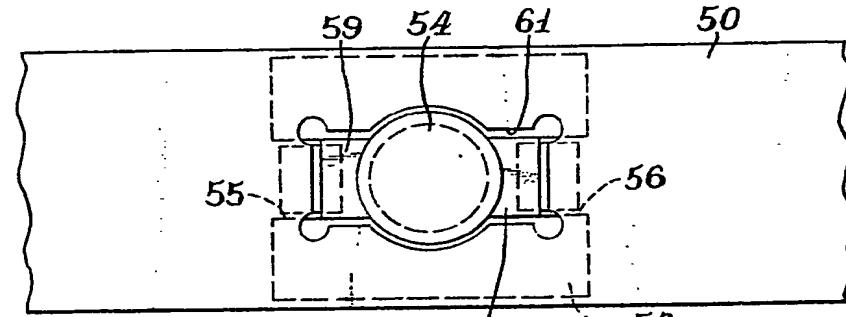
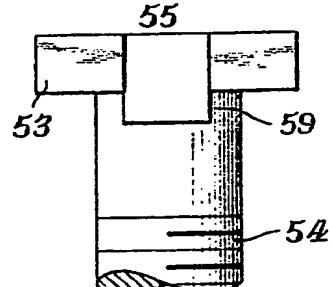
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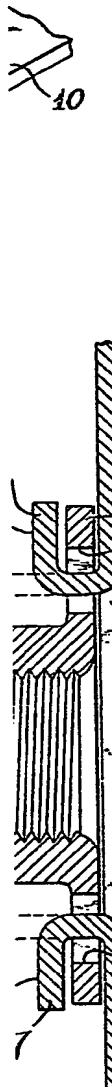
F.I. - 6.



F.I. - 7.



F.I. - 8.



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SHEETS 1 & 2

